## 10/539534

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## SEQUENCE LISTING .

<110> Umeda, Kazuaki

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Matsui, Takeshi
      Nakayama, Mayumi
<120> HIGHLY EFFICIENT GENE TARGETING VECTORS
  AND METHODS FOR GENE TARGETING IN EPITHELIAL CELL LINES
<130> 082368-004800US
<150> PCT/JP03/16549
<151> 2003-12-24
<150> JP 2003-076877
<151> 2003-03-20
<150> JP 2002-371621
<151> 2002-12-24
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